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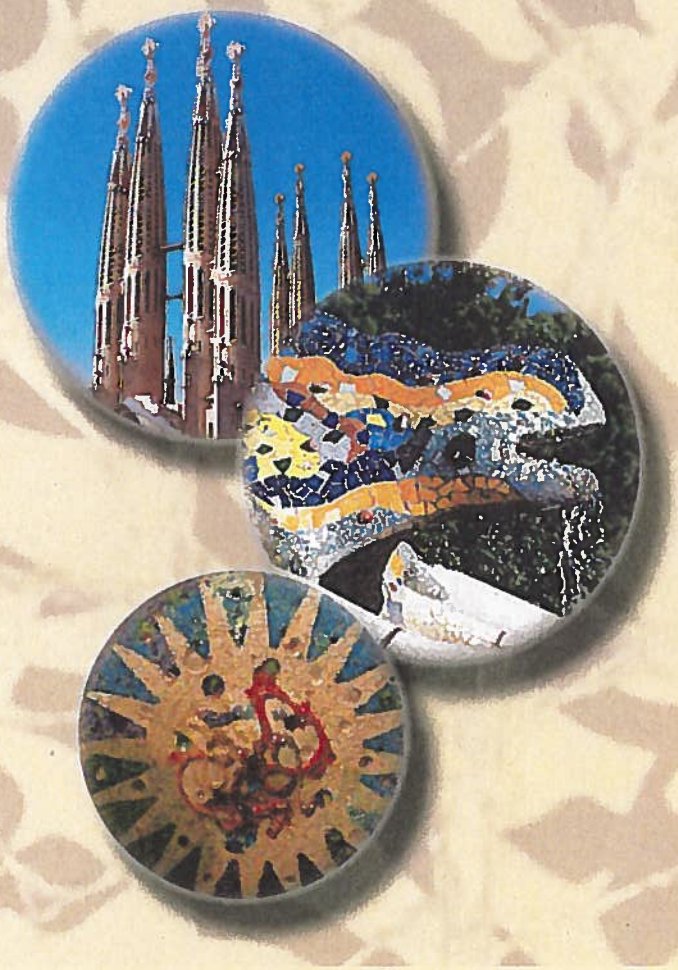

PROGRAMME • BOOK OF ABSTRACTS

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and S-Risk were evaluated for magnitude and direction and, if significant, for route and pathway causing the change. Some typical patterns became apparent. Following changes had significant impact:

- shift from a diffusion based vapour intrusion model to a diffusion-convection based model;
- reduction of soil-derived particle concentration in air on values for recreational and industrial areas;
- reduction of time spent on site for recreational areas.

Other differences required more in-depth substance-specific evaluation of the contributing routes and pathways.

This comparative exercise also reveals concerns with regard to overconservatism of specific parts of the integrated model, for which reasonable solutions were worked out.

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ASSESSING THE SOURCES FOR CHEMICAL STRESSORS IMPACTING SURFACE WATER ECOSYSTEMS AT THE CATCHMENT-SCALE

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Fulfilling the requirements of the WFD is challenging since multiple stressors frequently affect the ecological condition of streams, and traditional approaches for managing aquatic resources often fail to account for the combined effect of anthropogenic disturbances on biota. Ecological assessment methods currently in use reflect this, and typically focus only on a single type of stressor. To address this, current and novel methods for determining ecological status must be re-assessed, and comprehensive field studies seeking to distinguish stressor effects are needed. The purpose of the study was therefore to: (i) assess the applicability of different ecological evaluation methods for quantifying the impact of selected pollutants and (ii) identify and evaluate the sources for the dominant anthropogenic stressors impacting surface water ecosystems at the catchment-scale. A secondary objective was to evaluate possible water quality differences between site types and seasons.

We investigated 12 headwater streams in two catchments located on Sjaelland, Denmark. All streams were subject to multiple stressors of various types, including contaminated sites, urban discharges, and pesticide pollution from agriculture. A comprehensive field campaign, carried out over two years (2010 and 2011), included an analysis of water chemistry, xenobiotics including pesticides, physical conditions and benthic macroinvertebrates. For pesticides, the following sources were investigated: chronic exposure due to groundwater inflow, acute exposure due to stormwater runoff, and the presence of particulate-bound pesticides in storm-flows. Biomonitoring was conducted using the traditional Danish Stream Fauna Index (DSFI) and the more recent SPEcies At Risk (SPEAR) index. The results were supported by modelling studies using AQUATOX, a process-based ecological model.

Results show that traditional methods for determining ecological impact fail to account for all potential stressors affecting benthic macroinvertebrate populations in streams. In particular, pesticides were found to be essential contributors to the overall ecological impairment of the studied streams, but they are not accounted for in the DSFI. Chlorinated solvents and petroleum hydrocarbons were not found to impact benthic macroinvertebrates at measured stream concentrations. An evaluation of the origin of pesticides indicated that groundwater inflow is an important source for pesticides; but the dissolved-phase stream concentration levels, both from storm-flow and base-flow, are not likely to affect aquatic biota. These results were supported by AQUATOX modelling results, which indicated that stream discharge was the factor most limiting the modelled biomass concentrations for all species. However, chemical toxicity – evaluated using the toxic unit (TU) approach in conjunction with the SPEAR index – identified particulate-bound pesticides as the dominant source for ecotoxicity in the studied streams. A clear picture of stressor impacts was only possible, however, in catchments without physical habitat impairment. Targeted mitigation efforts on single anthropogenic stressors in catchments with major physical habitat impairment are thus unlikely to have substantial effects on ecological quality. We suggest that these results can be generalized to other sites, and may be indicative of an ecological response at larger catchment-scales. The implementation of new approaches to current ecological assessment procedures will improve our understanding of source-pathway-receptor linkages and ultimately guide remedial actions towards key contaminant sources.

SOIL ENVIRONMENTAL ASSESSMENTS ON SCHOOLS BUILT ON OR IN THE VICINITY OF PAST INDUSTRIAL FACILITIES

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As part of French environmental framework (law of August 3, 2009), environmental assessments on establishments accommodating children and adolescents were involved by the French Ministry of Environment. Assessments are carried out on schools built on or in the vicinity of potentially contaminated sites by past industrial activities. They are framed by the circular of May 4, 2010 co-signed by the French Ministry of Sustainable Development, the French Ministry of Education and the French Ministry of Health.

This is a major step towards a new way of approaching soil pollution policy considering both soil quality and their use to trigger investigation. This work draws the first conclusions of the existence of a potentially polluted soils register and demonstrates how to use it effectively.

The selection of schools was performed by crossing the schools database with the past industrial activities inventory (BASIAS). Around 2000 establishments on the entire country were identified. Although the BASIAS inventory provides information on past industrial activities, it does not enable to know the current soil quality. For this purpose, soil assessments must be done on the selected schools. The French State funded a five-year budget of about 50 million euros for this task.

In order to ensure the homogeneity of the action and costs control at the national level, BRGM was put in charge of the technical organisation of the assessments.

Assessments were designed to control if pollution that may be present in the soil, does not deteriorate the air inside the buildings, playground areas for young children, soil and drinking water. Taking into account the uses of schools facilities and contamination that may be found in soils and groundwater, assessments are made on the relevant media of exposure:

- if non-volatile pollution are involved, surface soils controls are

carried out in establishments accommodating children under 7 years if accessible bare soils are identified,
- if volatile pollution are involved, controls of soil gas and air in underfloor spaces, if any, are made. They are followed by controls of indoor air quality in case of trouble.
- if necessary drinking water quality in the distribution network is controlled.

Three categories of post-assessment situations are defined.
- Category A: the soil under the establishment poses no problem
- Category B: the current layout and uses of the establishment allow to protect people from exposure to potential or proven pollutants.

However information management procedures must be set up to explain what must be done if the facilities or uses of the school deteriorate or are modified.
- Category C: results reveal the presence of contamination that requires the implementation of technical management or even health protection measures.

Assessments results and ranking of establishments are examined by a national working group composed of representatives of all involved ministries and their technical support.
The assessments campaign started in summer 2010 on a first list of 900 establishments. Eventually, it will run on the entire country over a period of five years to involve a total of some 2000 establishments.
On July 2012, assessments were launched on 750 establishments. About 300 establishments have already been completed. 219 schools are in category A, 64 in category B and 4 establishments in category C. The 4 cases in category C are for contaminated soils by heavy metals that are accessible to young children. The implementation of health protection measures was not necessary.

EVALUATION OF THE FLEMISH OBLIGATION FOR SOIL INVESTIGATIONS

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The Soil Decree in Flanders requires a soil investigation in case of a transaction of a site or depending on the environmental permit. After more than 15 years of application, the OVAM wanted to evaluate the current so called list of risk activities (f.e. dry cleaning or a petrol station), leading to such an obligation.
The evaluation was executed by ARCADIS. Main objective was to determine in what extent soil investigation has led to remediation. When this hardly occurs, certain categories might be deleted from the list of risk activities and be released from the obligation to carry out a soil investigation. In the other way around, if a serious soil contamination (requiring a remediation) often occurs related to specific activities, the obligation for these activities to carry out soil investigation maybe ought to be intensified.
The evaluation was executed by counting how many times soil investigation lead to remediation. During the last 15 years OVAM registered the results of all the soil investigations required for by the Soil Decree. This 'Ground information register', containing over 30.000 records, was used as the main source for the evaluation. In general, 15% of the investigated sites indeed needed remediation and at 79% no serious contamination was revealed and therefore remediation was not necessary. The remaining 6% were related to sites where the investigation is still in progress.
Further the figures were connected with the activities on the sites and split up in five categories, as is shown in the table below.

5. high possibility for remediation (>40% of the sites with this activity need remediation, 7% of the total number of sites)
4. more than average possibility for remediation (20-40% of the sites with this activity need remediation, 34 % of the total number of sites)
3. average possibility for remediation (15-20% of the sites with this activity need remediation, 19 % of the total number of sites)
2. less than average possibility for remediation (7.5-15% of the sites with this activity need remediation, 25 % of the total number of sites)
1. low possibility for remediation (0-7.5% of the sites with this activity need remediation, 15 % of the total number of sites)

Those results were then reviewed with respect to content, using comparable figures from the Netherlands and (historical) knowledge about business processes. As a result a proposal was made to delete the obligation of soil investigation for those activities on the list where no more than 3% of the investigations lead to remediation.
Also an overview containing information about the (historical) business processes was put together for every remaining activity on the list. The changes and the additional information will be incorporated by OVAM in the 'risk activities tool', that will be able to tell stakeholders if soil investigation on their site is required.

ECOSYSTEM SERVICES FOR GROUNDWATER PROTECTION AND MANAGEMENT

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Soil Protection Technical Committee (TCB), NL

The ecosystem services concept is the key for connecting qualitative and quantitative aspects of ground water management and should be the starting point of each impact assessment. This is one of the key elements in the advice on ground water ambitions from the Soil Protection Technical Committee to the Dutch government.
Ground water ecosystem services refer to quality and quantity aspects of groundwater and include for instance drinking water supply, cold and heat storage, water storage, stability for building constructions, water buffering and supporting services like filtering of sustances, habitat for groundwater ecosystems and water supply of ground water depending terrestrial ecosystems.
For the insurance of the delivery of these services on the longer term, quantity aspects like discharge and extraction need to be balanced and the ground water quality should meet the required levels of chemical, biological and physical parameters.
By adopting the ecosystem services approach for groundwater protection, the protection goal is made explicit by identifying the relevant services in a certain context. And each service is related to responsible authorities and stakeholders, that are involved in the decision making processes. The enduring use of the service and the required investments in sustainable ground water management will ensure groundwater protection, if the basic management guidelines for ecosystem services are respected(based on EFSA 2010):
- Prevent exhaustion.
- Prevent side effects on other than the optimized ecosystem services and on surrounding ecosystems.
- Keep the recovery capacity of the services intact, within a reasonable timeframe.
- Give each service the requisite space.